

## USC School of Pharmacy

### **RXRS 402: Human Pharmacology: Challenge of Therapeutics in Society**

*Subject to change*

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Office Location: HSC campus PSC 506; Office Hours (by appt).

**Course Weight:** 4 units

**Days/Time/Location:** Tuesday, Thursday: 9:30 am to 10:50 am, WPH 205

#### **Introduction**

Pharmacology combines pharmacy (the science of drug preparation) and therapeutics (the treatment of disease with drugs and other means). This course is designed for upper-level undergraduate students from science majors who want to gain a working knowledge of how drugs are administered, what happens to them once in the body (pharmacokinetics [PK]) how drugs alter disease (pharmacodynamics [PD]); and potentially damage the body (toxicology). Content also focuses on the use of prescription and over-the counter drugs to prevent and treat diseases (pharmacotherapeutics). The course should give you a basic understanding of many different classes of drugs that are commonly prescribed. It should be important for undergraduates in Pre Pharmacy, Pre Medicine and other health and life science majors as well as students in biomedical engineering. Chapters from the core textbook will be supplemented with a variety of source materials including online resources and articles from scientific journals.

Course Objectives: Upon successful completion of this course, you should be able to:

- Describe how drugs are administered
- Describe the important pharmacokinetic parameters (absorption, distribution, metabolism and elimination; ADME) that affect drug dosing in a patient.
- Describe different drug-receptor interactions and the basic principles of pharmacodynamics (PD)
- Understand the basic principles in the use of drugs to prevent and treat diseases (pharmacotherapy).
- Describe and understand the importance of pharmacogenomics.
- Describe why particular drugs are prescribed (selected by the clinician) and used in patients and the monitoring of their effects (clinical pharmacology)
- Describe and understand the importance of proper drug use in the treatment of a disease and its relationship to health, economy, and wellbeing of society.

- Describe and understand the societal challenges and perceptions related to the economics of drug availability.
- Describe and understand why some drugs are toxic to humans and why some individuals have different reactions to a drug (basic principles of toxicology).

**Evaluation and Grading:**

Evaluation will be based on two midterm examinations, a final examination, course quizzes and class participation.

Class participation:	20 pts (10%)
5 quizzes @ 10 pts each	50 pts (25%)
2 midterm exams @ 35 pts each:	70 pts (35%)
1 final exam (partially cumulative):	<u>60 pts</u> (30%)
Total:	200 pts.

Class Participation and Attendance: Attendance at all classes is expected. Participation will include asking and answering questions and being actively engaged in the discussion. It is expected that students read the assigned papers prior to the lecture and be prepared to discuss background, current understanding, treatments, and gaps in knowledge for the topic in each lecture.

There will be 5 quizzes over the course of the semester that will primarily be based on questions pulled from the text book. The midterms (35 points each) will include multiple choice and T/F questions as well as a series of questions involving short answers.

The final exam (60 points) will include multiple choice and T/F questions as well as a series of questions involving short answers. The final exam will be cumulative, but will emphasize material covered after the 2<sup>nd</sup> midterm.

There are no make-up exams. If exceptional circumstances prevent you from attending an exam, your reason for missing it must be accompanied by a written statement from a third party (e.g. a note from a medical doctor).

Notes, books, calculators, electronic dictionaries, regular dictionaries, cell phones or any other aids are not allowed during exams.

Students will be asked to complete an anonymous critical evaluation of the course at its completion.

**Course Readings**

***Required Readings***

The text is mandatory for this course as it will greatly improve your grasp on the course content. There is a supplemental online student companion website for this course that can be accessed once the textbook is purchased. The chapters identified for your assigned reading in the in the text will support your learning process throughout the semester.

**Pharmacology by Karen Whalen, Pharm.D., BCPS**

**Edition: 6<sup>th</sup> ISBN 978-1-4511-9177-6**

**Format: Paperback w/ Access Code**

**Pub. Date: 2015**

**Publisher(s): Wolters Kluwer**

**Prerequisites:** Students should have at completed at least one year of undergraduate biology and/or chemistry (e.g., BISC 220/221 or CHEM 105A/B, etc).

Other topical materials including but not limited to the syllabus, supplemental reading assignments and additional handouts will be posted on <http://blackboard.usc.edu/>. Students will also be encouraged to use the online discussions sessions (via Blackboard) as an additional learning tool.

### Course Outline

This course will be in the format of a directed seminar/lecture under the guidance of the instructor for the specific session. During each weekly session the instructor will engage the students with questions and draw comments or interpretations primarily based on the assigned reading. Students are expected to ask questions and participate in an interactive fashion. Because this is an area of rapid change in policies, the readings may vary from one term to the next. Additional readings for each section that may be of added use are listed in the table below.

Course schedule is as follows:

Guest Speakers are **highlighted in Yellow**

Week & Date	Topic	Subtopics to be Included	Assigned and Supplemental Reading
	<b>Guest Lectures</b>		
Weeks 1-2. Aug. 21, 23	Introduction: expectations and goals of this class. Basic principles of pharmacology. Pharmacodynamics Pharmacokinetics Biotransformation Pharmacogenomics PK/PD	Basic Principles; The who and why drugs are used to treat disease; Drug-Body interactions: Pharmacodynamics (PD); Pharmacokinetics (PK); ADME; Dose; potency; sex differences; zero vs first order kinetics; first pass metabolism What is Pharmacology: <a href="https://www.youtube.com/watch?v=PQ2m-nrf2z8&amp;feature=youtu.be">https://www.youtube.com/watch?v=PQ2m-nrf2z8&amp;feature=youtu.be</a>	Pharmacology, Chapters 1-2 <b>Required watching to prepare for week two lectures.</b>  Basics on Pharmacokinetics: what the body does to a drug <a href="https://www.youtube.com/watch?v=NKV5iaUVBUI">https://www.youtube.com/watch?v=NKV5iaUVBUI</a>  Very brief overview of PD Utube: <a href="https://www.youtube.com/watch?v=tobx537kFaI">https://www.youtube.com/watch?v=tobx537kFaI</a>  PK: <a href="https://www.youtube.com/watch?v=mp93nPUzHqM">https://www.youtube.com/watch?v=mp93nPUzHqM</a> followed by watching: <b>Clearance:</b> <a href="https://www.youtube.com/watch?v=hHUFJAsgqkY">https://www.youtube.com/watch?v=hHUFJAsgqkY</a>
<b>Aug 28, 30</b>	<b>Dr. Ashutosh Kulkarni</b> (Allergan)  <b>Quiz #1 August 28</b>	<b>Clinical presentation: “How to effectively utilize PK/PD in the management of patients”</b>	

Weeks 3-4. Sept. 4, 6, 11, 13	Please take the time to review the UTube videos for cholinergic drugs.  Introduction to Autonomic Pharmacology; Drugs affecting the autonomic nervous system  <b>Quiz #2 Sept 13</b>	cholinergic drugs; anticholinergic drugs; adrenergic drugs; adrenergic blocking drugs.  Cholinergic drug UTube: <a href="https://www.youtube.com/watch?v=r-gJaMoMon0">https://www.youtube.com/watch?v=r-gJaMoMon0</a> Anti Cholinergic & Neuromuscular Blocking <a href="https://www.youtube.com/watch?v=cp_CZpCBVpk">https://www.youtube.com/watch?v=cp_CZpCBVpk</a>	Pharmacology, Chapters 3-7 Pharmacodynamics discussing protein targets: <a href="https://www.youtube.com/watch?v=tobx537kFaI">https://www.youtube.com/watch?v=tobx537kFaI</a>  UTube overview: <a href="https://www.youtube.com/watch?v=jA1NyCE4M2g">https://www.youtube.com/watch?v=jA1NyCE4M2g</a>  <a href="https://www.youtube.com/watch?v=41Xloc_vvX8">Anti- adrenergic Antagonist https://www.youtube.com/watch?v=41Xloc_vvX8</a>
Week 5. Sept. 18 & 20.	Drugs with important actions on smooth muscle	Histamine; serotonin; vasoactive peptides; the eicosanoids; nitric oxide; drugs used in asthma	Pharmacology, Chapters 29; 30; 31
Week 6. Sept. 25	<b>Midterm 1 Sept 25</b>		
Weeks 6-7. Sept. 27, Oct. 2  <b>Oct 4</b>	Introduction to <b>CARDIOVASCULAR-RENAL DRUGS</b>  <b>William Lu, PharmD</b>	Antihypertensive agents; vasodilators & the treatment of angina pectoris; drugs used in heart failure; agents used in cardiac arrhythmias; diuretic agents  <b>"Clinical perspectives on the management of Hypertension"</b>	Pharmacology, Chapters 17-23 Chapters 25; 26; 28  <b>HYPERTENSION &amp; ANTIHYPERTENSIVES (MADE EASY)</b> Utube: <a href="https://www.youtube.com/watch?v=V2sEay-E-Ro">https://www.youtube.com/watch?v=V2sEay-E-Ro</a> <b>Review for antiarrhythmic drugs:</b> <a href="https://www.youtube.com/watch?v=9xSgezCMHnw">https://www.youtube.com/watch?v=9xSgezCMHnw</a>
Weeks 8-9. Oct. 9, 11, 16  <b>Oct. 18</b>	<b>Quiz #3 Oct 10</b> Drugs affecting the endocrine system  <b>Tam Phan, PharmD</b>	Pharmacology of Anorectic Agents & Stimulants; Drugs for Diabetes; <b>"Clinical perspectives on the management of Diabetes"</b> <b>Using SOAP notes in the clinic</b>	Pharmacology, Chapters 25; 28 Utube: Exercise yes or no?? <a href="https://www.youtube.com/watch?v=eXTiiz99p9o">https://www.youtube.com/watch?v=eXTiiz99p9o</a>
Weeks 10-11 Oct. 23, 25,  <b>Nov 1</b>	<b>Quiz #4 Oct 25</b> Chemotherapeutic drugs <b>Tam Phan, PharmD</b>  <b>Thuy-Nhu Vo, PharmD</b>	<b>Clinical Management of HIV-Positive Individuals</b>  <b>Clinical Presentation: Principles of Antimicrobial Therapy</b>	Pharmacology, Chapters 37-42; 44; 45; 46  Principles of Antimicrobial Therapy; Cell Wall Inhibitors; Antimycobacterial Drugs; anthelmintic drugs; antiviral drugs, anticancer drugs; age-associated changes and the implications for drug therapy. <b>"Infectious Disease Pharmacotherapy"</b>
<b>Week 11. Oct 30</b>	<b>Midterm 2 Oct 30</b>		

Weeks 12-13. Nov. 6, 8, 13	Drugs that act on the CNS  <b>Melissa Durham, PharmD</b>	Introduction to the pharmacology of CNS drugs General Principles; drug mechanisms; Case Histories, Energy drinks; caffeine; alcohol <b>"Clinical perspectives on the management of Parkinson's Disease"</b> <b>Clinical Perspectives in Pain Management</b>	Pharmacology, Chapter 8 <b>1): Pathophysiology of Parkinson's Disease -- <a href="https://youtu.be/WCrZvSFr-TM">https://youtu.be/WCrZvSFr-TM</a></b> <b>2): Basic medications overview of PD. <a href="https://www.youtube.com/watch?v=zJBeHPEuIHs&amp;index=10&amp;list=PLUwPvKZhaW-EGXQELOQSAC5pHe8DaDbqY">https://www.youtube.com/watch?v=zJBeHPEuIHs&amp;index=10&amp;list=PLUwPvKZhaW-EGXQELOQSAC5pHe8DaDbqY</a></b>  Pharmacology, Chapters 37-42; 44; 45; 46
Weeks 13-14. Nov 15, 20	Drugs for other disorders  <b>William Lu, PharmD,</b>	Anti-inflammatory; antipyretic and analgesic agents  Case Studies in Geriatrics  <b>"Common treatments utilized in managing patients with the Common Cold"</b>	Pharmacology, Chapter 36
Week 15. Nov. 27, 29 (last day of class)	<b>Quiz #5 Nov 27</b>  <b>Clinical toxicology</b>  <b>Dr. Martiene Culty</b>	Risk vs Hazard; routes of exposure for toxins; important targets of toxicity; what makes a drug toxic; management of the poisoned patient.	Pharmacology, Chapter 48  <b>FRONTLINE: Supplements and Safety – <a href="https://www.youtube.com/watch?v=uXtr-Qelxcc">https://www.youtube.com/watch?v=uXtr-Qelxcc</a></b>
<b>Final Exam Dec 6<sup>th</sup> 11:00 am to 1:00 pm WPH 205</b>			

## Statement on Academic Conduct and Support Systems

### Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

### Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* [http://sait.usc.edu/academicssupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicssupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.

### Emergency Preparedness/Course Continuity:

In case of emergency, and travel to campus is difficult, USC executive leadership will announce an electronic way for instructors to teach students in their residence halls or homes using a combination of Blackboard, teleconferencing, and other technologies. Instructors should be prepared to assign students a "Plan B" project that can be completed at a distance. For additional information about maintaining your classes in an emergency please access:

<http://cst.usc.edu/services/emergencyprep.html>

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unacceptable. See additional information in SCampus and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

#### Support Systems:

Student Counseling Services (SCS) – (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. [engemannshc.usc.edu/counseling](http://engemannshc.usc.edu/counseling)

National Suicide Prevention Lifeline – 1 (800) 273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. [www.suicidepreventionlifeline.org](http://www.suicidepreventionlifeline.org)

Relationship and Sexual Violence Prevention Services (RSVP) – (213) 740-4900 – 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. [engemannshc.usc.edu/rsvp](http://engemannshc.usc.edu/rsvp)

#### Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: [sarc.usc.edu](http://sarc.usc.edu)

Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class. [equity.usc.edu](http://equity.usc.edu)

#### Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. [studentaffairs.usc.edu/bias-assessment-response-support](http://studentaffairs.usc.edu/bias-assessment-response-support)

#### The Office of Disability Services and Programs

Provides certification for students with disabilities and helps arrange relevant accommodations. [dsp.usc.edu](http://dsp.usc.edu)

Student Support and Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. [studentaffairs.usc.edu/ssa](http://studentaffairs.usc.edu/ssa)

#### Diversity at USC

Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. [diversity.usc.edu](http://diversity.usc.edu)

#### USC Emergency Information

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible. [emergency.usc.edu](http://emergency.usc.edu)

USC Department of Public Safety – UPC: (213) 740-4321 – HSC: (323) 442-1000 – 24-hour

emergency or to report a crime. Provides overall safety to USC community. [dps.usc.edu](http://dps.usc.edu)